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GUEST EDITORIAL

Division of the Colorectum Into Anatomic Subsites: Why and Where?

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The thyrde grete gutte highte Colon. . .is joyned fast to the nether openynge of all the body. *Barth. Trevisa,* 1398 [1]

Fyrste it behoueth to begyn at the ars gut that is called longaum or rectum.

R. Copland Guydon's Quest. Chirurg., 1541 [1]

The purpose of division of the colorectum into anatomic subsites is perhaps self-evident to surgeons. We in fact do it all the time when treating colorectal cancer (CRC). The traditional point of division (between the colon and rectum) was exemplified by the practice of performing abdominoperineal resection with permanent colostomy for all rectal lesions [2], even those quite high in the pelvis, and abdominal colectomy with ileorectal anastomosis for all colonic lesions, even in the cecum [3]. As colonic resections became somewhat more limited, a hazy border in the colon was drawn somewhere in the transverse colon, a right hemicolectomy being done for cecal lesions and left hemicolectomy being done for sigmoid lesions. Epidemiologists interested in determining what caused CRC and how it might be prevented followed the surgeons' anatomical borders in seeking site specificity of suspected risk factors such as fat, fiber, beer, or cholecystectomy.

A century of CRC research has made the original surgical purpose of these divisions obsolete. Anterior resection as well as a host of local procedures has replaced abdominoperineal resection for all but the most distal lesions. Abdominal colectomy is rarely done for colonic cancer. It is usually reserved for familial syndromes. Epidemiologists have similarly not found this method of anatomic division particularly useful. None of the major risk factors for CRC such as fat, fiber, antioxidant vitamins, or physical activity seem to be focused on any of these subsites. Only beer (in the rectum) and cholecystectomy (in the cecum) seem to have a marginal propensity for risk modification to specific subsites [4].

Even more problematic is the issue of misclassification. It was not obvious to me where the rectum ended and the colon began, much less where the border between the right and left colon was. A pathologist usually has to make this determination, having never seen the specimen in situ. Epidemiologic investigations would be more likely to be inconclusive regarding subsite specificity, biased towards the null hypothesis, if misclassification by subsite was rampant. Because I was curious to find out whether others in my field were similarly perplexed, I once asked each participant of our weekly colorectal surgery journal club, without allowing them to discus this among themselves, to write down the definition of the rectum. These participants included four attending colorectal surgeons, two colorectal fellows, two enterostomal therapists, two general surgery residents, and two medical students. I received 12 completely different definitions. The most interesting definition came the next day from a mentor at the School of Public Health, Bill Haenszel. He avoided anatomy and said that the rectum is the most common site of CRC in low-risk populations. However, the region that changes the fastest when risk goes up, as in migrant populations, is next door in the sigmoid [5]!

Surveillance, Epidemiology, and End Results (SEER), a cancer data collection program of the National Cancer Institute, collects data on CRC subsites. In their initial collection, the colorectum is divided not into 2 or 3 regions, but into 13 very specific regions (such as cecum, ascending colon, hepatic flexure, etc.). Many state tumor registries collect the same data. In order to determine whether any anatomic subdivision is worthwhile, it seemed advisable to erase old borders and construct new ones based upon review of data SEER had on subsite and other demographic variables to see whether relationships using new borders became clearer. This we did as part of

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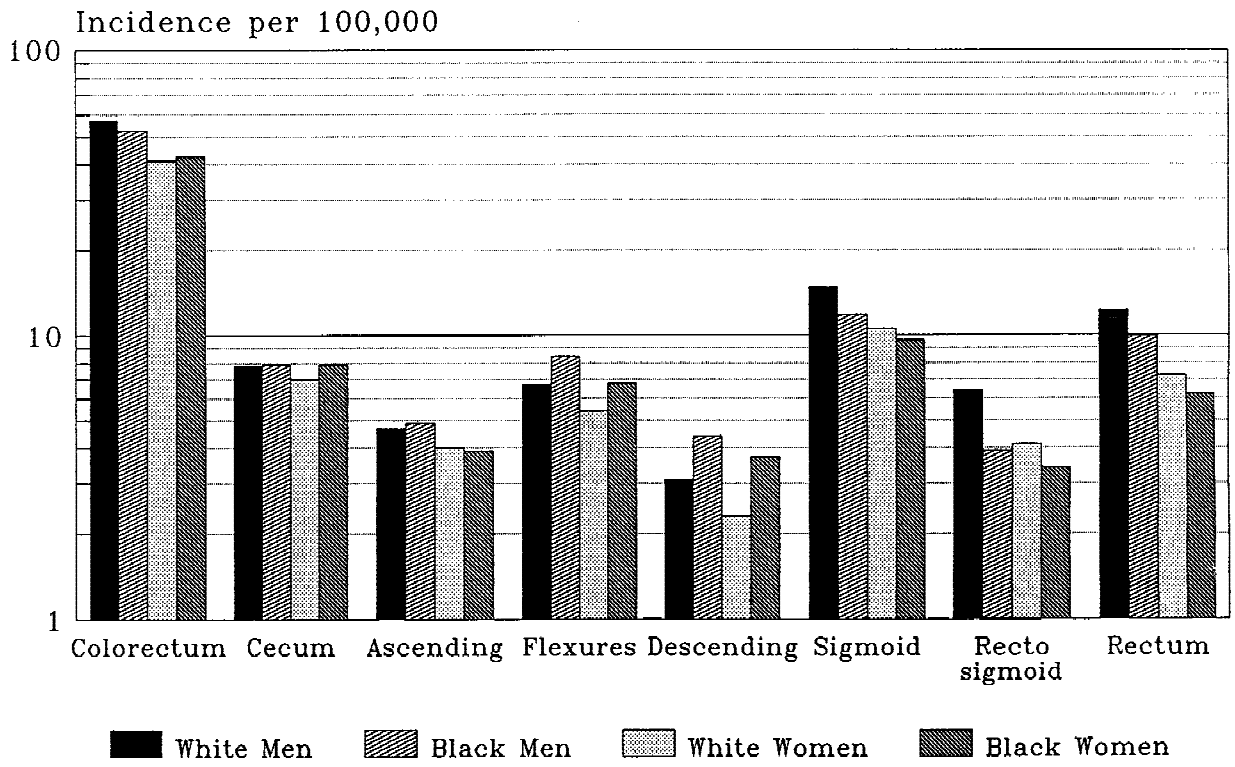

Fig. 1. Age-adjusted colorectal cancer incidence by race, gender, and subsite. Combined Surveillance, Epidemiology, and End Results (SEER) subsite data, 1976–1987. Reprinted from Nelson et al. [6], Cancer, Vol. 80, No. 2, 1997, pages 193–197. Copyright © 1997 American Cancer Society. Reprinted by permission of Wiley-Liss, Inc., a subsidiary of John Wiley & Sons, Inc.

an investigation of the role that race, gender, and age played on CRC risk, using the Illinois tumor registry [6].

Looking at the incidence of CRC in various race/gender groups by subsite, it appeared that there was a natural division of the colorectum between the descending colon and sigmoid colon (Fig. 1). The distal colorectum could then be constituted of the sigmoid, rectosigmoid, and rectum above the anal canal. The proximal colon would be made up of the cecum through the descending colon. Using this point of division, the roles of race and gender in CRC incidence became clearer, proximal disease being very much associated with African-American race and distal CRC more determined by male gender (Fig. 2).

This is a natural border in other respects as well. It is the anatomic border between the midgut and hindgut. It marks the proximal insertion limit of the fiberoptic sigmoidoscope, an important tool in screening for CRC [7]. About half of all CRC now occurs distal to this point, and half proximally. (Is there anybody old enough to remember when students were taught that half of all CRC could be detected by digital rectal examination?) Classification bias is less of a problem, because it is not nearly as crowded a border as the junction between the rectum and the sigmoid.

The anal canal (from the anorectal ring or puborectalis to the anal verge or outer edge of the internal sphincter) forms the third anatomic region in CRC. Tumors in this region are very different from proximal cancers. Some risk factors unique to this region are papillomavirus, anal sexual intercourse [8], and benign anorectal disease [9]. Histology is far more variable than in proximal CRC. Primary treatment is not surgical for most if not all tumors in this anatomic region, perhaps independent of histology.

What would it take to forget about the colon and rectum and consider instead the proximal and distal colorectum? Perhaps there is too much history in these terms to abandon them. Radiotherapy is clearly beneficial for tumors in the pelvis, i.e., rectum. Transanal or transsphincteric excision of tumors of the distal rectum alone is feasible.

On the other hand, we have already shown that time trend investigation of CRC risk is clarified by this new anatomic classification [4]. Current surgical practice, especially for distal lesions, is more consistent with this system. Epidemiologic examinations of environmental risk factors for CRC may reveal relationships to specific subsites previously not seen in the old classification system.

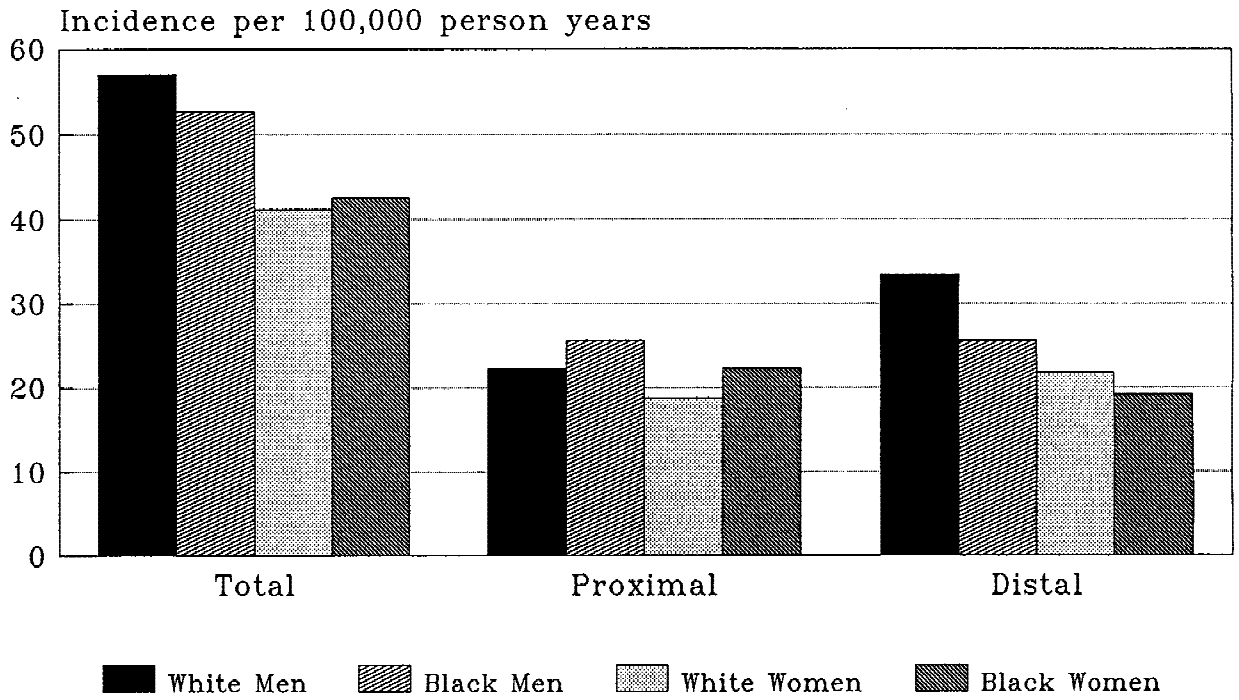

Fig. 2. United States colorectal cancer incidence by anatomic region, race, and gender (age-adjusted). Surveillance, Epidemiology, and End Results (SEER) data, 1976–1987. Proximal: cecum through descending colon; distal: sigmoid colon through rectum. Reprinted from Nelson et al. [6], Cancer, Vol. 80, No. 2, 1997, pages 193–197. Copyright © 1997 American Cancer Society. Reprinted by permission of Wiley-Liss, Inc., a subsidiary of John Wiley & Sons, Inc.

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